CLAIMS

1. A microscope objective, especially for total internal reflection microscopy, characterized in that the microscopic objective has at least one optical fiber.

2. The microscope objective according to claim 1, characterized in that illumination light can be coupled directly into the microscope objective through the optical fiber.

3. The microscope objective according to either of claims 1 or 2, characterized in that at least part of the optical fiber is mechanically attached in the microscope objective and/or to the microscope objective.

4. The microscope objective according to any of claims 1 to 3, characterized in that the optical fiber has an outcoupling end that is arranged in the microscope objective.

5. The microscope objective according to any of claims 1 to 4, characterized in that the outcoupling end is arranged in a plane (Fourier plane) that is conjugate to the focal plane of the microscope objective.

6. The microscope objective according to claim 5, characterized in that the outcoupling end is arranged in a plane (Fourier plane) that is conjugate to the focal plane of the microscope objective that is closest to the front lens of the microscope objective.

7. The microscope objective according to any of claims 1 to 6, characterized in that the outcoupling end is arranged at a lateral distance from the optical axis of the microscope objective.

8. The microscope objective according to any of claims 1 to 7, characterized in that the optical fiber has an incoupling end into which illumination light can be coupled.

9. The microscope objective according to claim 8, characterized in that the illumination light exiting from the outcoupling end of the optical fiber passes through the optical edge region of the microscope objective.

10. The microscope objective according to any of claims 1 to 9, characterized in that the illumination light exits from the objective after passing through the objective at an adjustable angle relative to the optical axis.

11. The microscope objective according to claim 10, characterized in that, for purposes of setting the angle, the position of the outcoupling end in the microscope can be changed.

12. A microscope with a microscope objective, characterized in that the microscope objective has at least one optical fiber.

13. The microscope according to claim 12, characterized in that illumination light can be coupled directly into the microscope objective through the optical fiber.

14. The microscope according to either of claims 12 or 13, characterized in that at least part of the optical fiber is mechanically attached in the microscope objective and/or to the microscope objective.

15. The microscope according to any of claims 12 to 14, characterized in that the optical fiber has an outcoupling end that is arranged in the microscope objective.

16. The microscope according to any of claims 12 to 15, characterized in that the outcoupling end is arranged in a plane (Fourier plane) that is conjugate to the focal plane of the microscope objective.

17. The microscope according to claim 16, characterized in that the outcoupling end is arranged in a plane (Fourier plane) that is conjugate to the focal plane of the microscope objective that is closest to the front lens of the microscope objective.

18. The microscope according to any of claims 12 to 17, characterized in that the outcoupling end is arranged at a lateral distance from the optical axis of the microscope objective.

19. The microscope according to any of claims 12 to 18, characterized in that the optical fiber has an incoupling end into which illumination light can be coupled.

20. The microscope according to any of claims 12 to 19, characterized in that the illumination light exiting from the outcoupling end of the optical fiber passes through the optical edge region of the microscope objective.

21. The microscope according to any of claims 12 to 20, characterized in that the illumination light exits from the objective after passing through the objective at an adjustable angle relative to the optical axis.

22. The microscope according to claim 21, characterized in that, for purposes of setting the angle, the position of the outcoupling end in the microscope can be changed.

23. The microscope according to any of claims 12 to 22, characterized in that the microscope has at least one source of illumination light that emits illumination light that can be coupled into the incoupling end of the optical fiber.

24. The microscope according to any of claims 19 to 23, characterized in that the incoupling end of the optical fiber is arranged in a plane that corresponds to the focal plane of the microscope objective.

25. The microscope according to any of claims 19 to 23, characterized in that the incoupling end of the optical fiber is arranged in an the intermediate image plane of the microscope.

26. The microscope according to any of claims 23 to 25, characterized in that the microscope has a beam deflector with which the illumination light can be directed onto the incoupling end of the optical fiber.

27. The microscope according to any of claims 12 to 26, characterized in that the illumination light that is transported through the optical fiber serves for TIRF illumination.

28. The microscope according to any of claims 12 to 27, characterized in that the light of the illumination light source for TIRF illumination can be coupled into the optical fiber and can bypass the optical fiber for purposes of direct specimen illumination.

29. The microscope according to any of claims 12 to 28, characterized in that the microscope is a scanning microscope.

30. The microscope according to any of claims 12 to 29, characterized in that the microscope is a confocal scanning microscope.